

SVETLANA TECHNICAL DATA
4CX800A
High Performance Tetrode

The Svetlana 4CX800A is a high- performance ceramic metal tetrode with a plate dissipation rating of 800 watts with forced air cooling. The performance characteristics of the 4CX800A allow its use aas a high gain grid-driven RF amplifier or in grounded grid service. A recommended mode of operation is in grid-driven service with a passive (resistive) 50 ohm untuned input circuit. This eliminates the need for multiple input tuned circuits and neutralization. In this mode, an exceptionally simple, stable, low-cost amplifier with good intermodulation performance can be designed.

As a linear power amplifier, the 4CX800A will conservatively produce 750 watts PEP SSB, and 750 watts Key Down CW in any of the three modes: grid-driven, grid-driven passive input, and cathode-driven. Because of the high performance characteristics of the 4CX800A , the tube will operate efficiently at low plate voltage.

Characteristics

Electrical

Cathode:		*Oxide-coated*
Voltage	*12.6 ± 0.7*	*V*
Current, at 12.6 volts	*3.6 ± 0.3*	*A*
Voltage cathode-heater, max.	*± 100*	*V*
Warm-up time	*2.5*	*min.*
Amplification factor, grid-to-screen	*6.5 ± 2*	
Direct interelectrode capacitance (grounded cathode):		
Input	*51 ± 5*	*pF*
Output	*11 ± 2*	*pF*
Feedback	*0.09*	*pF*
Frequency for maximum ratings	*150*	*MHz*

Mechanical

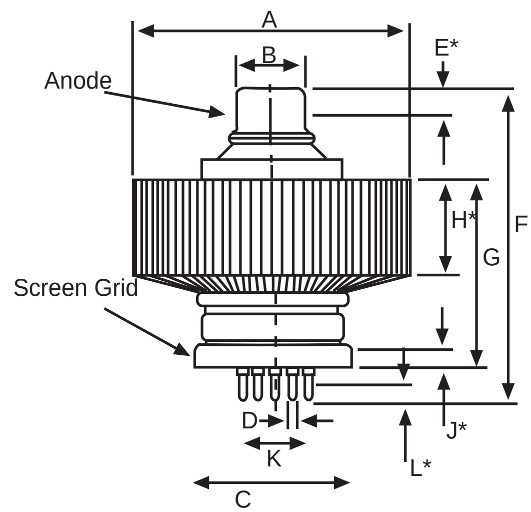
Maximum overall dimensions:	
Length	*90 mm (3.51 in.)*
Diameter	*72 mm (2.81 in.)*
Net weight	*550 g (1.21 lb.)*
Operating position	*Any*
Cooling	*Forced air*
Maximum operating envelope temperature	*200°C*
Recommended socket	*Svetlana SK-1A*
Recommended anode connector	*Svetlana AC-1*

Radio Frequency Linear Amplifier Class AB_1

Maximum ratings

DC plate voltage	*2.5*	*kV*
DC screen voltage	*350*	*V*
DC grid voltage	*-150*	*V*
DC Plate current	*0.8*	*A*
Plate dissipation	*800*	*W*
Screen dissipation	*15*	*W*
Grid dissipation	*2*	*W*

Svetlana Outline drawing



*Contact Surface

Dimensional Data

Dim.	Inches			Millimeters		
	Min.	Max.	Ref.	Min.	Max.	Ref.
A	2.756	2.835		70	72	
B	0.669	0.748		17	19	
C	1.988	2.028		50.5	51.5	
D	0.053	0.060		1.34	1.53	
E	0.394	–		10	–	
F	–	3.543		–	90	
G	2.008	2.126		51	54	
H	0.747	0.860		20	22	
J	0.197	–		5	–	
K	–	–	0.7	–	–	175
L	0.3	0.37		7.6	9.4	

Note: Ref. dimensions are for reference

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Typical Operation (grid driven, single tone)

Frequency	*60*	*60*	*MHz*
Power output	*550*	*780*	*W*
DC plate voltage	*2*	*2.2*	*kV*
DC screen voltage	*300*	*350*	*V*
*Bias voltage**	*-37*	*-47*	*V*
Zero-signal plate current	*300*	*360*	*mA*
DC plate current	*465*	*630*	*mA*
DC screen current	*30*	*30*	*mA*
Peak rf grid voltage	*30*	*35*	*V*
Plate dissipation	*380*	*600*	*W*
Intermodulation distortion measured by two tone method at 1 MHz:			
3rd order		*-30*	*dB*
5th order		*-40*	*dB*

Typical Operation, Linear with Cathode Resistance

	Grid Driven		*Cathode Driven*		
DC plate voltage	*2200*	*2200*	*2200*	*2200*	*V*
Bias voltage	*-56*	*-57*	*-57*	*-63*	*V*
Zero signal plate current	*160*	*150*	*100*	*70*	*mA*
DC plate current	*550*	*520*	*590*	*490*	*mA*
Plate input power	*1200*	*1150*	*1300*	*1100*	*W*
Driving voltage	*75*	*77*	*52*	*64*	*V*
DC grid current	*0*	*0*	*0*	*0*	*mA*
Driving power	*56*[1]	*59*[1]	*27*[1]	*41*[1]	*W*
Power output	*750*	*750*	*750*	*750*	*W*
Intermodulation distortion					
3rd order	*-30*[2]	*-30*[2]	*-32*[2]	*-32*[3]	*dB*
5th order	*-43*[2]	*-42*[2]	*-40*[2]	*-35*[3]	*dB*
Efficiency	*63*	*65*	*58*	*68*	*%*
Zero-signal plate dissipation	*352*	*330*	*200*	*154*	*W*
DC screen voltage	*350*	*350*	*300*	*300*	*V*
DC screen current	*24*	*24*	*20*	*17*	*mA*
Cathode resistance	*24*[4]	*33*[4]	*0*	*24*[4]	*ohms*

Typical Operation, FM Broadcast Power Amplifier

	CCS	
DC Plate Voltage	*2200*	*V*
Bias Voltage	*-70*	*V*
Driving Voltage	*80*	*V*
DC Plate Current	*500*	*mA*
DC Screen Current	*30*	*mA*
DC Grid Current	*12*	*mA*
Power Output	*800*	*W*
Screen Dissipation	*8*	*W*
Grid Dissipation	*1*	*W*
Efficiency	*73*	*%*

** Approximate value adjusted to specified zero-signal plate current*

Notes:
1. The drive power is determined with a 50 ohm resistive input circuit.
2. The intermodulation distortion level does not deteriorate with decreasing drive voltage.
3. The level of intermodulation distortion with decreasing drive voltage does not deteriorate to less than -28 dB and -35 dB respectively corresponding to a driving voltage of 50 V.
4. Increasing the resistance in the cathode circuit decreases the zero-signal plate current and increases the drive power required.

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Linear Operation Operating conditions with feedback are shown in the table on the previous page under Typical Operation, Linear with Cathode Resistance. This mode of operation is recommended for linear amplifier service where low zero signal plate current together with good intermodulation performance is required. These conditions were optimized for 750 watts power output, low zero signal plate current and intermodulation performance. A resistor is introduced in the cathode circuit to provide degeneration for improved linearity and reduced zero signal plate current. Increasing the resistance in the cathode circuit decreases the zero signal plate current and increases the required drive power. The drive power shown in the table was determined using a 50 ohm resistor for the input circuit. Note that no input tuned circuit or neutralization is required.

Plate Operation The rated maximum plate dissipation power of the 4CX800A is 800 watts. The tube and associated circuits should be protected in the event of an internal arc by including a series current limiting resistance in the DC lead from the power supply to the plate. Its value must be 25 ohms or more. The resistor should be capable of withstanding the high surge current caused by the arc, and should not be used as a fuse.

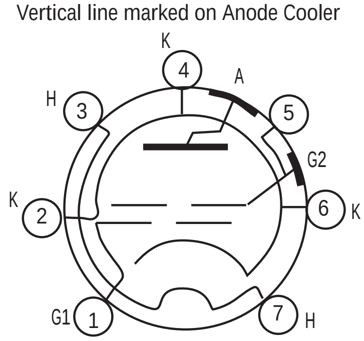
Control Grid Operation The maximum grid dissipation rating of the 4CX800A is 2 watts. The grid should not be driven unless screen and plate voltage is applied. The grid and associated circuitry should be protected against current surges in the event of internal arcs by a source impedance of greater than 50 ohms. For stability, the source impedance should not exceed 1K ohms.

Screen Grid Operation The maximum rated power dissipation for the screen grid is 15 watts. The screen current may reverse under certain conditions and produce negative current. This is a normal characteristic of most tetrodes. The screen power supply should be designed with this characteristic in mind. A current path from screen to cathode must be provided and the source impedance should not exceed 3K ohms. When plate voltage, plate load or bias voltage is removed, screen grid voltage should be turned off automatically. Otherwise, screen grid power dissipation will be exceeded.

Cathode Operation The cathode is internally connected to pins 2, 4 and 6. Three of the corresponding socket terminals should be used to make connection to the external circuits. At radio frequencies, it is important to keep the cathode leads short and direct and to use conductors with large areas to minimize the inductive reactances in series with the cathode leads.

Mounting The Svetlana SK-1A socket is available for use with the 4CX800A. The SK-1A has a built-in annular screen bypass capacitor of 0.01 µF suitable for use at HF and VHF. The tube may be mounted in any orientation.

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Vertical line marked on Anode Cooler



Bottom View

Svetlana 4CX800A Air-Flow Requirements				
Plate power dissipation (Watts)	Sea level		5,000 feet	
	Air flow CFM	Pressure drop in./water	Air flow CFM	Pressure drop in./water
Cooling air at 25°C				
400	6	0.1	7	0.2
600	12	0.2	14	0.3
800	20	0.5	25	0.6
Cooling air at 50°C				
400	8	0.2	10	0.2
600	17	0.4	21	0.4
800	29	0.835	35	0.6

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